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(71) Applicant: **ELETTROPLAST S.r.l.**
32015 Puos d'Alpago (Belluno) (IT)

(72) Inventor: **De Bastiani, Bruno**
32015 Puos D'Alpago, Prov. of Belluno (IT)

(74) Representative:
Modiano, Guido, Dr.-Ing. et al
Modiano & Associati SpA
Via Meravigli, 16
20123 Milano (IT)

(54) Display cladding and insulation method, particularly for electronic control instruments

(57) A method for cladding and insulating displays, particularly for electronic control instruments, comprising the steps of: producing a cover (A) to be associated with an instrument containment box (B); preparing molds for injection-molding two-component or multi-component materials, said molds being shaped so as to provide a rigid part (10), with at least one flat transparent part (12) for instrument viewing, and so as to provide a soft and flexible cladding (20), which clads exposed regions of said rigid part (10) and is interposed with a lower rim (22) and a first perimetric tooth (23) between said cover (A) and said box (B).

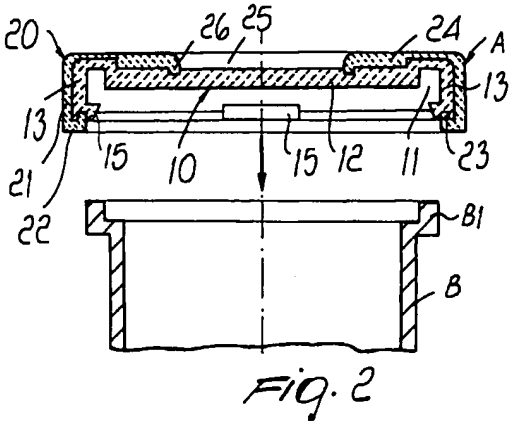

Fig. 2

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Description

[0001] The present invention relates to a method for applying and forming a thermoplastic cladding to displays and buttons of covers and/or boxes for electrical or electronic instruments, particularly control, actuation and adjustment instruments and instruments for the most disparate functions.

[0002] Current electrical or electronic instruments for controlling and adjusting systems or machines are notoriously constituted by a box which accommodates the specific instruments and by a cover which allows to functionally read them and to intervene, by means of buttons, in order to adjust and calibrate the operating conditions of the system connected to each individual instrument.

[0003] These instruments are generally arranged on suitable panels which cluster them in appropriate subframes in order to have an overall view and control of the entire system or structure of the machine to which the various instruments are assigned.

[0004] Each box of these instruments must be fixed to the panel or subframe so as to ensure that it is hermetic with respect to external agents and ensure that the cladding is transparent, in order to view the measurable data, and is flexible so as to be able to apply the necessary pressure to the various buttons of the instruments that compose it.

[0005] According to the current art, these characteristics are generally achieved by cladding the display and the outer surface of the cover with a transparent and sufficiently flexible film which is associated with the cover by means of a frame provided with adapted screw or snap-on couplings which allow to anchor it to the box.

[0006] The current art further provides for the interposition of adapted gaskets between the cover and the edge of the box, as well as between the edge of the box and the edge of the compartment for housing it in the panel, in order to ensure the prescribed hermetic sealing of the panel with respect to external agents.

[0007] It is evident that although this method ensures the required conditions of transparency, flexibility and sealing, it requires a plurality of operations which affect preparation times and costs as well as the hermetic seal and are entrusted to the technical skill of the individual installer.

[0008] The aim of the present invention is to provide a cover or a box, for instruments of the exemplified type, which ensures the best conditions in terms of hermetic sealing and of adequate flexibility and transparency, regardless of the skill of the installer.

[0009] Within the scope of this aim, an object of the present invention is to minimize the number of parts to be produced and associated, eliminating the need for cladding containment frames.

[0010] Another object of the present invention is to minimize the time and cost for assembling the cladding on the cover or part of the box to be applied to the panel and be made transparent, flexible and hermetic.

[0011] This aim, these objects and others which will become apparent hereinafter are achieved with the treatment method according to the present invention, as defined in claim 1.

[0012] A characteristic of the present invention is that the cladding of said covers or boxes is performed by injection-molding with multi-component materials, one or more materials being meant for injection in order to form one or more rigid parts for fixing, supporting and viewing the elements of the individual specific instruments, an additional material being meant to externally clad the previously molded rigid parts and also act as a gasket, in order to hermetically seal the box that contains the instruments applied to the control panel.

[0013] Further characteristics and advantages of the invention will become apparent from the following detailed description of a preferred but not exclusive embodiment of the method according to the invention, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

Figure 1 is a sectional view of a rigid and transparent element to be clad in order to provide a hermetic and internally visible cover executed according to the invention, to be applied to boxes for containing electrical or electronic instruments for controlling the most disparate systems or machines;

Figure 2 is a sectional view of a cover for a box of electrical or electronic instruments, provided by using the rigid and transparent element of Figure 1, and of the box to which the cover is to be associated;

Figure 3 is a sectional view of a different embodiment of the cover of Figure 2.

[0014] In all the figures, the same details are designated by the same reference numeral.

[0015] According to the constructive solution proposed in the accompanying figures, as an application of the method according to the invention, a cover A of a box B is constituted by a rigid part 10, made of a suitable transparent material, and by a cladding 20, made of a suitable soft and flexible material, and the two parts 10, 20 are interconnected and produced in two different steps of a single process for molding with two-component materials, in order to obtain a cover A which is adapted to be associated with the box B of the instrument, ensuring the required qualities of transparency, hermetic sealing and flexibility.

[0016] The cover and the box are made of a rigid material, such as the plastic material known commercially as polycarbonate or by the trade-name Bayblend of the German company Bayer.

[0017] Such material is used in its semitransparent formulation, known for example by the trade-name Makrolon of the German company Bayer, for the cover.

[0018] The cladding is made of soft and/or flexible material, for example known commercially as thermoplastic rubber or polyurethane or by the trade-name Desmopan of the German company Bayer.

[0019] According to the current art in the field of molding with two-component or multiple-component materials, each molding step can be performed independently, with a mold which provides for the formation of a first element and with successive molds into which the already-formed elements are inserted, or the various steps can be performed in succession with a molding machine in which in any case a first molded element is associated and included in the molding of the successive elements.

[0020] By way of example and for the sake of simplicity in description, the steps of the present method are described hereinafter, assuming that the method is performed with a succession of mutually independent or non-independent injections performed with a single machine for molding a plurality of materials.

[0021] With particular reference to Figures 1 and 2, which hypothetically represent the case of providing a cover which has only one transparent surface in order to view the display of the instruments, in a first step a mold for forming the rigid part 10 and a second mold for forming the cladding 20, associated with the preceding rigid part 10, are prepared.

[0022] Since the box B for containing the instruments is provided with a rim B1, the mold for the rigid part 10 must have a perimetric recess 11 which surrounds for example a flat transparent part 12 of the cover A.

[0023] The perimetric recess 11 is provided by forming an outer wall 13 which has, on its lower perimetric rim, a perimetric groove 14 and a suitable number of locators 15 which protrude at right angles with respect to said groove toward the inside of the cover and are suitable to allow the snap-on engagement of the rigid part 10 on the rim B1 of the box B.

[0024] The rigid part 10 advantageously has, on the flat transparent part 12, a groove 16 adapted to delimit the region where the cladding 20 is applied around the display viewing surface that the box B is meant to contain.

[0025] The second mold to be prepared in order to form the cladding 20 of the cover A, according to the present method, provides for a surface for resting against the internal surface of the rigid part 10, such as to leave free the outer wall 13, the groove 14 and its locators 15.

[0026] The mold further has a suitable lateral filling volume in order to form an external cladding wall 21, with a lower rim 22 provided with a perimetric tooth 23, produced by filling the groove 14 of the rigid part 10.

[0027] The same mold then provides for the filling of a suitable volume in order to obtain a region 24 for partially cladding the outer surface of the flat transparent part 12, obtaining at least one free space 25 delimited by the groove 16 provided in the rigid part 10.

[0028] After preparing the two molds as described above, and after preparing the materials to be injected into the two different molds, the plastic material is injected in a subsequent step in order to form the rigid part 10 and/or a semitransparent part.

[0029] In an additional step, the rigid part 10 is accommodated in the mold in order to form the cladding 20, so as to ensure the formation of the outer cladding walls 21 and of the lower rim 22 with a first perimetric tooth 23 and of the partial cladding region 24 with the free space 25.

[0030] Said free space 25 is delimited by the groove 16 and the partial cladding region 24 has a second tooth 26.

[0031] The fact is noted that the presence of the second perimetric tooth 26 and of the first perimetric tooth 23, in addition to ensuring maximum hermetic sealing of the cover A, also ensures maximum cohesion between the rigid part 10 and the cladding 20 even if they have different thermal expansions.

[0032] The cover A thus formed can be easily applied to the box B after the chosen control instruments have been inserted therein, with an optional display to be arranged at the free space 25 for perfect reading thereof.

[0033] With reference to Figure 3, as mentioned, the hypothetical case is considered of producing a cover A' in which it is necessary to form, in addition to the free space 25, a flexible cladding 27 which covers a button located inside the cover A' and meant to be actuated repeatedly.

[0034] As easily understandable, during the preparation of the molds a hole 17 is provided in the flat transparent portion 12 of the rigid part 10, so as to allow the button to pass and allow the passage of the mold in order to form the internal part of the flexible cladding 27.

[0035] Likewise, the second mold for forming the cladding 20 has a suitable shaping of the region of the flexible cladding 27; the remainder of its shape remains unchanged.

[0036] The other steps for injection-molding and forming the cover A', according to what has already been illustrated, also remain fully unchanged.

[0037] From the above description it is evident that with the present method it is possible to obtain a cover A having adequate visibility, flexibility and hermetic sealing, despite being formed by a minimal number of parts to be produced and assembled, according to the specified aim and objects.

[0038] In particular, attention is drawn to the fact that the lower rim 22 and the first tooth 23, along the entire outer wall 13 of the cover A, constitute a safe and stable gasket against infiltrations between an appropriately provided supporting panel and the box B with the cover A, which contains and supports the chosen control, actuation and adjustment instruments, eliminating any problem relating to poorly executed assembly, in

accordance with one of the stated objects.

[0039] As mentioned, the various execution steps of the proposed method can actually be modified and adapted to specific requirements: by way of example, mention is made of the possibility to provide the present cladding method by using normal multi-component injection-molding machines, with consequent adaptation of the described method.

[0040] It is also possible to provide covers A which are composed for example of a transparent rigid part associated with an opaque rigid part and are clad with a soft or flexible cladding 20, forming a plurality of molds and consequently extending the forming steps, always and in any case according to the illustrated method.

[0041] Likewise, it is possible to apply the present method also when producing boxes in which visibility and instrument actuation are arranged at their bottom, or in any other region thereof, and therefore optionally without a cover, since they are applied from the inside of said supporting panel.

[0042] The invention is of course susceptible of numerous other modifications and variations, all of which are within the scope of the same inventive concept.

[0043] The materials and the dimensions that constitute the individual components of the invention may of course also be the most pertinent according to specific requirements.

[0044] The disclosures in Italian Patent Application No. BL98A000020 from which this application claims priority are incorporated herein by reference.

[0045] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. An electronic control instrument, constituted by a cover (A;A') and an instrument containment box (B) made of rigid and/or semitransparent material, characterized in that at least one cladding (20) made of soft and/or flexible material is associated with said cover and/or box.

2. A method for cladding and insulating displays, particularly for electronic control instruments, characterized in that it comprises the steps of: producing a cover (A) to be associated with an instrument containment box (B); preparing molds for injection-molding two-component or multi-component materials, said molds being shaped so as to provide a rigid part (10), with at least one flat transparent part (12) for instrument viewing, and so as to provide a soft and flexible cladding (20), which clads exposed regions of said rigid part (10) and is interposed with a lower rim (22) and a first perimetric tooth (23) between said cover (A) and said box (B).

3. The cladding method according to claim 2, characterized in that during mold preparation one or more holes (17) are provided for the passage of the part of the mold that is meant to form the internal part of a further flexible cladding (27) which covers one or more buttons to be operated and for the passage and positioning of said buttons, to be pressed by pushing said further flexible cladding (27).

4. The method according to claim 3, characterized in that in order to provide each cover (A), after the step for preparing the molds there is a first step for injection-molding in the mold meant to form said rigid part (10), monolithically or in multiple parts which are associated to each other by means of successive injections in molds which comprise the part that has already been molded, in order to obtain said rigid part (10) provided with an optional flat transparent part (12) for viewing the display or other parts of the instrument of said box (B) and with said one or more holes (17).

5. The method according to claim 2, characterized in that in a subsequent step said rigid part (10) is accommodated in a final mold so that it can be clad with said cladding made of soft and/or flexible material.

6. The method according to claim 2, characterized in that said cladding made of soft and/or flexible material forms at least one partial cladding region.

7. The instrument according to claim 1, characterized in that said cladding (20) has outer cladding walls (21), a lower rim (22), and a first perimetric tooth (23).

8. The instrument according to claim 1, characterized in that at least one flat transparent part (12) is provided on a rigid part (10), a partial cladding region (24) being formed on the outer surface of said transparent part (12), obtaining at least one free space (25) delimited by a groove (16) provided in said rigid part (10).

9. The instrument according to claim 8, characterized in that said rigid part has a perimetric recess (11) which surrounds said flat transparent part (12) of said cover (A), said perimetric recess (11) being obtained by providing an outer wall (13) which has, on its lower perimetric rim, a perimetric groove (14), in addition to a plurality of locators (15) which protrude at right angles to said groove toward the inside of said cover and are adapted to achieve the

snap-on engagement of said rigid part (10) on a rim (B1) of said box (B).

10. The instrument according to claim 9, characterized in that said rigid part (10) has, on said flat transparent part (12), said groove (16), which is suitable to delimit the region where said cladding (20) is applied around the viewing surface of a display that said box (B) is meant to contain.

11. The instrument according to claim 8, characterized in that said partial cladding region (24) which forms at least one free space (25) for the best viewing of the instruments, forms a second tooth (26) which acts as a further seal and provides maximum coupling of said cladding with said rigid part (10).

12. The instrument according to claim 8, characterized in that said lower rim (22), said first perimetric tooth (23) and said outer wall (13) of said rigid part (10) form a gasket surface for sealing said cover (A) and said box (B).

13. The instrument according to claim 8, characterized in that it comprises, on said cover (A'), at said free space (25), at least one flexible cladding (27) which covers a button which is arranged inside the cover (A') and is meant to be actuated repeatedly.

14. The instrument according to claim 13, characterized in that on said flat transparent part (12) of said rigid part (10) there is provided a hole (17) which is suitable for the passage of the button and for the passage of a mold for forming the internal part of said flexible cladding (27).

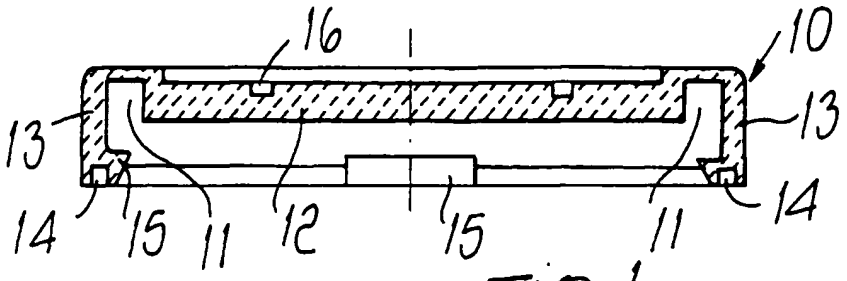

FIG. 1

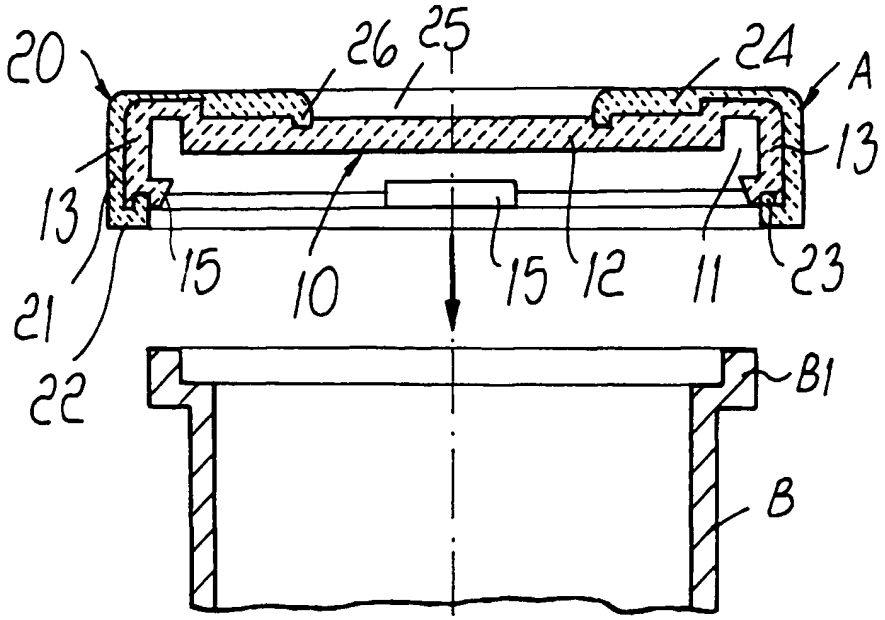

FIG. 2

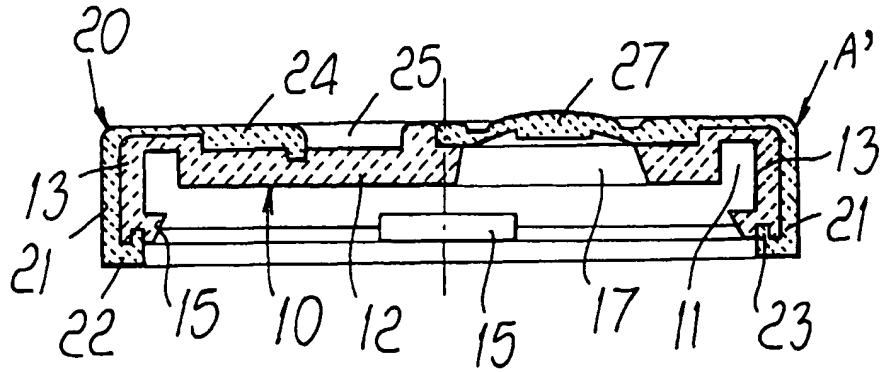

FIG. 3